

“What do I need to know about this ‘bird flu’ that everyone is talking about?”

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What are the goals of the “talk?”

- Define “the flu.”
- Explain how influenza spreads
- Discuss epidemics vs pandemics
- Describe “bird flu”
- Share strategies to deal with influenza pandemics



What is ‘the flu’?

Answer: An illness caused by influenza virus

- A sudden onset respiratory illness accompanied by fever
- Flu causes yearly epidemics worldwide
- **NOT** the nausea/vomiting/diarrhea that people call “the stomach flu.”



Are there different types of flu?

Answer: Yes!

- Type A— moderate to severe illness
 - All age groups; many animals
- Type B— milder than A
 - Humans only; mainly children
- Type C— rarely reported in humans
 - No epidemics



Time out, coach! How are viruses different from other germs?

- Much smaller than animal cells or bacteria
- Viruses need to get a life!
 - Need to be inside our cells to live
- Our cells become virus factories
- Influenza virus kills cells in breathing passages



What does an influenza virus look like?

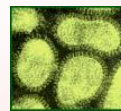


Fig.1 Electron micrograph

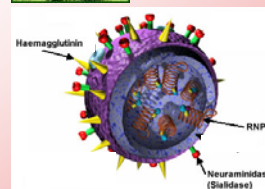


Fig.2 Schematic of influenza virus

- **Hemagglutinin protein**
 - Allows virus to stick to cells of some animals and not others
- **Neuraminidase protein**
 - Helps release new virus from cells
- **Genes (RNP) divided into 8 parts**
 - Allows 2 viruses to mix and match genes



Why are the “H” and “N” numbered?

Answer: They stand for different hemagglutinins (“H”) and neuraminidases (“N”)

- Used to subtype influenza A strains
 - 16 different H’s
 - 9 different N’s
- Current human subtypes
 - A(H1N1) and A(H3N2) primarily
- Antibodies against H’s and N’s made by our immune system protect us
- H and N subtypes are basis for flu vaccines



What are the symptoms of influenza?

- Sudden fever, muscle aches, headache, lack of energy, dry cough, sore throat, runny nose
- Fever and body aches last 3 to 5 days
- Cough and lack of energy– 2 weeks
- Symptoms similar to other respiratory infections
- Supportive care (avoid aspirin)
 - Rest, fluids, anti-cough & anti-fever meds
 - Antivirals if symptoms for < 48 hours



How is influenza spread?

Answer: Very quickly due to short incubation!

- 2 days after you catch the virus, you feel sick
- Infected people shed virus; make others sick
 - Shedding can begin 1 day BEFORE you feel sick
 - Peak shedding first 3 days of illness
 - Subsides by 5-7 days
 - Can be 10+ days in children



Is flu only spread through the air?

Answer: Mainly spread by large droplets in air.



- **Large droplet mostly**
 - Generated by coughing, sneezing, talking
 - “spitting distance”
- **Contact with contaminated hands or surfaces, sometimes**
- **Microscopic droplets less common**



What is the difference between an epidemic and pandemic?

Answer: They primarily differ in scope and the mechanisms by which they occur.

- Epidemics occur every year due to **minor** changes in influenza A viruses that circulate
 - Same H and N as previous years
- Pandemics happen only occasionally when a completely new influenza A virus circulates
 - **DIFFERENT** H and/or N from previous years



How do yearly epidemics occur?

Answer: A process called antigenic **DRIFT**.

- Imperfect “manufacturing” of virus
 - Small changes in H and N
 - Partial immunity in population
 - Incomplete protection; still get sick
 - Need new flu vaccine every year

Mutation
H3N2 → H3N2



What are the consequences of yearly epidemics in U.S.A?

- > 36,000 die and 200,000 are hospitalized
- 5 to 20% of general population infected
- Nursing home attack rates of up to 60%
- 85% of flu-related deaths in ages > 65
- Over \$10 billion lost



What drives the occurrence of a pandemic?

Answer:

Instead of antigenic *DRIFT* occurring, an antigenic...

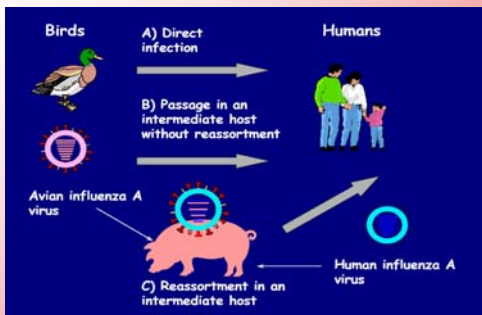
SHIFT

H5N1

...happens.



How does antigenic shift happen?



What about past flu pandemics?



Credit: US National Museum of Health and Medicine

1918: "Spanish Flu"
A(H1N1)

20-40 m deaths
675,000 US deaths

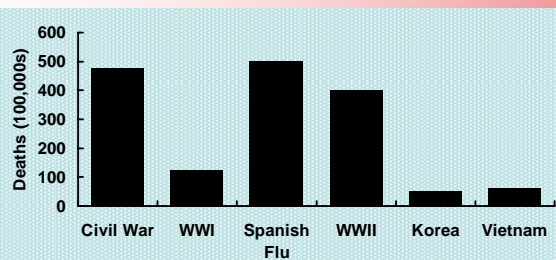
1957: "Asian Flu"
A(H2N2)

1-4 m deaths
70,000 US deaths

1968: "Hong Kong Flu"
A(H3N2)

1-4 m deaths
34,000 US deaths

Can you put pandemic flu into perspective for me?



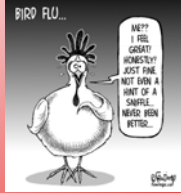
What consequences might result from a pandemic, now?

- Infected: 90 million US, >500,000 NE
 - Based on 30% attack rate
- Hospitalized: 865,000 to 9.9 million US
 - (NE Range 4,928 to 56,472)
- Deaths 209,000 to 1.9 million US
 - (NE Range 1,181 to 10,832)
- \$71-166 billion would be lost
- Serious social and economic disruption

What is “bird flu?”

Answer: Currently, the term refers primarily to avian influenza A strain H5N1.

- Wild birds carry all known influenza A subtypes
- Recognized in Hong Kong '97 – 1.5 million birds culled in 3 days
- Has spread throughout Asia & more recently to the Middle East, Africa, and some European countries.



How does “bird flu” affect birds?

Answer: Ranges from asymptomatic to fatal.

- Wild birds carry it, but usually don't get sick
- Domestic birds often suffer fatal infections
 - Current H5N1 outbreak most severe ever
 - Hundreds of millions of birds killed/culled
- Other animals can catch it (hosts expanding)
 - Pigs, horses, sea mammals
 - Recent spread to cats, leopards tigers



Avian Flu Human Infections

1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

1918
H1N1



1957
H2N2



1968
H3N2



1997
H5N1



2003
H5N1



2005
H5N1



2006
H5N1



How does “bird flu” affect humans?

Answer: There have been 278 human cases of H5N1 flu with 168 deaths as of 03/12/07.

- Vietnam 93, Indonesia, Thailand, China, Turkey, Cambodia, Iraq, Azerbaijan, Egypt, Djibouti, Lao People's Democratic Republic, Nigeria
- No sustained person-to-person transmission
- Most have severe viral pneumonia (lung infection)
- Unusual symptoms in patients from Vietnam (10 cases, 8 deaths)
 - Lacked sore throat, runny nose
 - 3 reported coughing up bloody phlegm
 - 7 with diarrhea

FOR UPDATES http://www.who.int/csr/disease/avian_influenza/country/en



What is required for a pandemic to occur?

- **Answer:** A new virus with person-to-person spread.
- ✓ Novel virus to which population has little or no immunity
- ✓ Virus that causes severe illness in humans
- Virus must be capable of sustained person-to-person transmission



Can bird flu be treated?

- **Answer:** Possibly. We only have lab tests and animal experiments to rely on right now.
- Current strain resistant to older drugs
 - Amantadine and rimantadine
- Sensitive to “N” inhibitors
 - Oseltamivir (Tamiflu®)– capsules and oral liquid
 - Zanamivir (Relenza®)– Inhaled powder



Will a flu vaccine protect me?

Answer: No, current vaccines do not protect against bird flu.

- Protects against expected strains
 - A(H1N1), A(H3N2), and B
- H5N1 investigational vaccine
 - Able to induce antibodies in adults
 - May or may not protect against pandemic strain when it emerges



What can public health do?

- **Enhanced surveillance**
- **Develop detailed response plans & practice**
 - Guidelines for vaccine and antiviral prioritization
- **Import and Travel limitations**
 - Limit travel to/from countries/continents affected by pandemic
 - Isolate ill and quarantine exposed
 - Trace contacts
 - Cancel public gatherings (school, meetings, sporting events)
- **Stockpile antivirals and vaccine**



Surveillance...am I being watched!?

Answer: Yes!

- World Health Organization (WHO)
 - 6 regional offices
 - 112 National Influenza Centers in 89 countries
 - 4 WHO Collaborating Centers (WHOCCs)
 - Australia, Japan, UK, and USA
- WHO makes recommendations on vaccine composition based on surveillance data
- USDA has done avian flu surveillance in poultry for decades.



Who's watching in Nebraska?

- Influenza Sentinel Provider Surveillance System
 - 11 providers (report to CDC)
 - LHDs have flu surveillance plans
- Lab test result reporting
 - 65 labs report
- School absenteeism survey
 - LHD enter data
- Influenza-Like-Illness admissions
 - 19 district/local health departments
 - 89 acute care hospitals



Are stockpiles of antivirals and bird flu vaccine adequate?

Answer: No.

- U.S. Oseltamivir stockpiles (hard to produce)
 - Current: 2.3 million courses; 4.3 by end of 2005
 - Ordered: 44 million courses (15%); states option 10%
 - IDSA need estimate: minimum 90 million (130 ideal)
- U.S. H5N1 vaccine stockpiles
 - Plan to purchase: 20 million doses
 - If not protective vs pandemic strain, will take 4-6 months to develop (egg production is a limiting factor)



What has Nebraska done in planning?

- Pan Flu Plan– “Evergreen” document
- Engagement of stakeholders and citizens
 - Governor’s Pan Flu Committee–
 - April 11, 2005
 - November 14, 2005
 - Citizen’s review group– Sept. 24, 2005
 - Strong support of PH by both groups
- Widespread education of providers and guidance on antiviral use



What are Nebraska's pandemic flu vaccination goals?

1. Maintain the ability to provide quality health care, implement pandemic response activities and maintain vital community services.
2. Protect persons at highest risk for influenza mortality.
3. Decrease transmission of infection to those at highest risk for influenza mortality.
4. Maintain other important community services.
5. Protect the population at large.



Are there federal guidelines for vaccine priority groups?

- | | | |
|---------------|---|--|
| Tier 1 | A | Vaccine Producers direct care medical workers |
| | B | Persons > 65 with compromising conditions |
| | C | Pregnant women; Household contacts of compromised persons |
| | D | Public health emergency responders and key public officials. |
| Tier 2 | A | Healthy 65 and older and children |
| | B | Emergency response, essential services |
| Tier 3 | | Key government and society leaders |
| Tier 4 | | Healthy Persons |



How can businesses prepare?

Answer: Make business continuity plan.

- Identify staff for critical functions
- Suspend non-critical functions
- Build depth by cross-training workers
- Alternative work schedules
- Explore telecommuting possibilities
- Teach workers cough "etiquette" and hand hygiene
- Use government pandemic planning checklist
– <http://www.pandemicflu.gov/plan/>



How can I prepare?

- Practice cough etiquette
- Wash hands or use alcohol-based hand gel
- Keep hands away from eyes and mouth unless hands were washed
- Annual flu vaccine to prevent seasonal flu
- Pneumonia shot if in high risk group
- Avoid others if you are sick
- Individual checklist:
<http://www.pandemicflu.gov/plan/>
- DO NOT STOCKPILE TAMIFLU OR RELENZA



What should I do if I want to travel to countries that have bird flu?



- No travel restrictions currently
- Avoid contact with live animal markets and poultry farms
- Ensure all food from poultry is thoroughly cooked (eggs, too!)
– 165 degrees
- Careful hand hygiene
- Monitor health for 10d post return; if you get flu symptoms, tell provider about symptoms and travel **BEFORE** you get to office



The only thing more difficult than planning would be explaining why you did not do it!

-- Marja Esveld

Healthcare Inspectorate, The Netherlands



Acknowledgements

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